

## CLAIMS

- 1    1.    A fuel for a direct methanol fuel cell comprising:  
2                 methanol, and  
3                 an effective amount of an additive that undergoes a reaction with water to produce  
4                 small molecules that are easily electro oxidized.
  
- 1    2.    A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is  
2                 dimethyloxymethane.
  
- 1    3.    A fuel for a direct methanol fuel cell as in claim 2, wherein the fuel comprises  
2                 about 20 mole percent dimethyloxymethane.
  
- 1    4.    A fuel for a direct methanol fuel cell as in claim 3 further comprising less than  
2                 about .1% by weight of an indicating dye.
  
- 1    5.    A fuel for a direct methanol fuel cell as in claim 4 where the indicating dye in-  
2                 cludes sulfonated activated carbon particles.
  
- 1    6.    A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is  
2                 methylorthoformate.
  
- 1    7.    A fuel for a direct methanol fuel cell as in claim 6, wherein the fuel comprises  
2                 about 10 mole percent methylorthoformate.
  
- 1    8.    A fuel for a direct methanol fuel cell as in claim 7 further comprising less than  
2                 about .1% by weight of an indicating dye.
  
- 1    9.    A fuel for a direct methanol fuel cell as in claim 8 where the indicating dye in-  
2                 cludes sulfonated activated carbon particles.

- 1    10.    A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is
- 2    tetramethylorthocarbonate.
  
- 1    11.    A fuel for a direct methanol fuel cell as in claim 10, wherein the fuel comprises
- 2    about 10 mole percent tetramethylorthocarbonate.
  
- 1    12.    A fuel for a direct methanol fuel cell as in claim 11 further comprising less than
- 2    about .1% by weight of an indicating dye.
  
- 1    13.    A fuel for a direct methanol fuel cell as in claim 12 where the indicating dye in-
- 2    cludes sulfonated activated carbon particles.
  
- 1    14.    A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is tri-
- 2    methylborate.
  
- 1    15.    A fuel for a direct methanol fuel cell as in claim 14, wherein the fuel comprises
- 2    about 7 mole percent trimethylborate.
  
- 1    16.    A fuel for a direct methanol fuel cell as in claim 15 further comprising less than
- 2    about .1% by weight of an indicating dye.
  
- 1    17.    A fuel for a direct methanol fuel cell as in claim 16 where the indicating dye in-
- 2    cludes sulfonated activated carbon particles.
  
- 1    18.    A fuel for a direct methanol fuel cell as in claim 1 wherein the additive is tet-
- 2    ramethylorthosilicate.
  
- 1    19.    A fuel for a direct methanol fuel cell as in claim 18, wherein the fuel comprises
- 2    about 5 mole percent tetramethylorthosilicate.

- 1    20. A fuel for a direct methanol fuel cell as in claim 19 further comprising less than
- 2    about .1% by weight of an indicating dye.
  
- 1    21. A fuel for a direct methanol fuel cell as in claim 20 where the indicating dye in-
- 2    cludes sulfonated activated carbon particles.
  
- 1    22. A fuel for a direct methanol fuel cell comprising:  
2       methanol; and  
3       at least one additive that undergoes a reaction with water to produce small mole-  
4       cules that are easily electro oxidized selected from the group consisting of: di-  
5       methylloxymethane, methylorthoformate, tetramethyl orthocarbonate, trimethyl  
6       borate, and tetramethyl orthosilicate.
  
- 1    23. A fuel for a direct methanol fuel cell as in claim 22 further comprising less than
- 2    about .1% by weight of an indicating dye.
  
- 1    24. A fuel for a direct methanol fuel cell as in claim 23 where the indicating dye in-
- 2    cludes sulfonated activated carbon particles.
  
- 1    25. A fuel additive for a direct methanol fuel cell consisting essentially of at least one  
2       additive that undergoes a rapid reaction with water to produce small molecules that are  
3       easily electro oxidized selected from the group consisting of: dimethylloxymethane,  
4       methylorthoformate, tetramethyl orthocarbonate, trimethyl borate, and tetramethyl ortho-  
5       silicate; and an effective amount of an indicating dye.
  
- 1    26. A fuel for a direct methanol fuel cell comprising:  
2       methanol, and  
3       an effective amount of a metal hydride.
  
- 1    27. A fuel for a direct methanol fuel cell comprising:  
2       methanol;

3           an effective amount of an additive that undergoes a reaction with water to produce  
4        small molecules that are easily electro oxidized; and  
5        an effective amount of a metal hydride.

1   28.   A fuel for a direct methanol fuel cell comprising:  
2           methanol; and  
3           an effective amount of at least one additive that undergoes a reaction with water  
4        to produce small molecules that are easily electro oxidized selected from the group con-  
5        sisting of: dimethyloxymethane, methylorthoformate, tetramethyl orthocarbonate, tri-  
6        methyl borate, and tetramethyl orthosilicate; and  
7        an effective amount of a metal hydride.

1   29.   A method for enabling the detection of fuel leaking from a fuel cell comprising  
2        the step of adding a dye to the fuel.

1   30.   A method for enabling detection of fuel leaking from the fuel cell according to  
2        claim 29 where the dye comprises sulfonated activated carbon particles.

1   31.   The method of preparing a fuel mixture for a direct methanol fuel cell comprising  
2        the steps of:  
3           a)      providing a supply of concentrated methanol; and  
4           b)      adding an effective amount of a at least one additive that undergoes a re-  
5                  action with water to produce small molecules that are easily electro oxi-  
6                  dized selected from the group consisting of: dimethyloxymethane, meth-  
7                  ylorthoformate, tetramethyl orthocarbonate, trimethyl borate, and tet-  
8                  ramethyl orthosilicate.

1   32.   The method of preparing a fuel mixture for a direct methanol fuel cell as in claim  
2        30 further comprising the step of :  
3           c)      providing a supply of concentrated methanol; and

- 4 adding an effective amount of at least one metal hydride selected from the group con-
- 5 sisting of LiAlH<sub>4</sub>, NaBH<sub>4</sub>, LiBH<sub>4</sub>, (CH<sub>3</sub>)<sub>2</sub>NHBH<sub>3</sub>, NaAlH<sub>4</sub>, B<sub>2</sub>H<sub>6</sub>, NaCnBH<sub>3</sub>, CaH<sub>2</sub>,
- 6 LiH, NaH, KH and sodium bis (2-methoxyethoxy) dihydridaluminate.